REMARKS

The foregoing amendments and remarks that follow are responsive to the Office Action dated September 30, 2009.

Summary of Office Action

In the Office Action, the Examiner rejected Claims 1-6 and 8 under 35 U.S.C. 102 (b) as being anticipated by U.S. Patent No. 6,543,712 issued to Grimmel et al. Claim 7 was rejected under 35 U.S.C. 103(a) as being unpatentable over the Grimmel et al. reference, and further in view of U.S. Patent No. 5,142,177 issued to Higuchi et al. Claims 9-12 and 18 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Grimmel et al. reference, and further in view of U.S. Patent No. 4,643,592 issued to Lewis et al. Claims 13-16 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Grimmel et al. reference and Lewis et al. reference, and further in view of U.S. Patent No. 3,680,932 issued to Raimondi. Claim 17 was rejected under 35 U..C. 103(a) as being unpatentable over the Grimmel et al. reference, the Lewis et al. reference, and further in view of U.S. Patent No. 6,135,639 issued to Dede.

Summary of Amendments

Upon entry of this amendment, Claims 1-18 will have been cancelled, and Claims 19-27 will have been added.

Response to 35 U.S.C. § 102(b) Rejection

In the Office Action, the Examiner rejected independent Claim 1, as well as dependent Claims 2-6 and 8 under 35 U.S.C. 102(b) as being anticipated by the Grimmel et al. reference. By this response, Applicant has cancelled independent Claim 1 and dependent Claims 2-6 and 8, thereby rendering the Examiner's rejection under 35 U.S.C. 102(b) moot. However, Applicant will discuss new Claims 19-27 in the context of Examiner's rejection under 35 U.S.C. 102(b).

New Claim 19 incorporates the content of original Claims 1, 9, and 10. Given that Claims 9 and 10 were not rejected under 35 U.S.C. 102(b), Applicant submits that new Claim 19 is also not anticipated by the Grimmel et al. reference.

Response to 35 U.S.C. § 103(a) Rejection

As noted above, new Claim 19 includes the content of original Claims 1, 9, and 10. In the Office Action original Claims 9 and 10 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Grimmel et al. reference, and further in view of the Lewis et al. reference. Accordingly, the following section discusses the Grimmel et al. and Lewis et al. references in the context of new Claim 19.

1. New Claim 19

New Claim 19 relates to a laying head for forming coils of continuous and substantially rectilinear rolled products. The laying head includes a support structure, and a rotor adapted to rotate about its own axis under the action of motor means. The rotor is held in rotation by the support structure by means of bearings. There are only two bearings, and at least one of the two bearings incorporates vibration dampening means comprising an oil film bearing of the hydrodynamic type.

2. The Cited References Do Not Disclose or Suggest All of the Limitations of New Claim 19

Reference is now made to Figures 1-4 of the Grimmel et al. reference. As understood, the Grimmel et al. reference discloses a laying head for forming coils using continuous and substantially rectilinear rolled products including a support structure (10 and 36), a rotor (12) adapted to rotate about its own axis (22) under the action of a motor means and held in rotation by the support structure (10) by means of bearings (16 and 20). The Grimmel et al. reference additionally includes a pressing device (36), incorporating a bearer (38) which may be interpreted as a vibration dampening means.

Applicant notes that the Grimmel et al. reference was discussed on page 1, lines 30-33, and page 2, lines 1-7 of the present patent application, which is reproduced below for the Examiner's convenience:

> *"The document US 6543712 has the object of attaining a rolling speed greater than 120 m/sec. To do this, a third support is used, arranged in the intermediate position between the two bearings and this reduces deformation of*

the rotor shaft with the result that the critical speeds increase in value. This type of support is composed of rollers radially arranged with respect to the shaft but this device is very complicated in mechanical terms and has low efficiency, since also the rollers are provided with their own flexibility. Having small diameters, the rollers are subjected to extremely high rotational speeds. Another drawback of this solution consists in the fact that even minimum differences in coaxiality between the end bearings and the additional support cause unacceptable vibrations in the system."

Conversely, the laying head recited in new independent Claim 19 includes a rotor with only two support bearings, wherein the first bearing includes a smaller diameter on the inlet side and the second bearing includes a larger diameter on the outlet side of the rotor. Claim 19 additionally recites that the vibration dampening means are incorporated into at least one of the two bearings, i.e., are provided in the structure of one of the bearings. The Grimmel et al. reference does not disclose this feature. In this respect, the Grimmel et al. reference does not anticipate new Claim 19.

Applicant additionally submits that none of the other cited references appear to disclose this arrangement.

The technical effect obtained by the laying head recited in new Claim 19 is to obtain a laying head that can operate at a rolling speed of over 120 m/sec up to at least 140 m/sec without being affected by harmful vibrations caused by dynamic amplification phenomenon at acceptable engineering costs, without mechanically complicating the devices and without giving rise to severe wear conditions of the mechanical elements.

Applicant respectfully submits that the objection raised by the Examiner, that a person skilled in the art at the time the invention was made would arrive at a laying head according to new Claim 19, by combining the teachings of Grimmel et al. with the bearings disclosed in Lewis et al. cannot be followed for the following reasons.

Firstly, even if acting with ex post facto analysis, the skilled man would think to provide hydrodynamic vibration dampening devices in a rotor having two bearings, and a vibration dampening device situated in a position intermediate these bearings. He would not arrive at a laying head according to new Claim 19 having only two bearings.

Secondly, it is unlikely that the skilled man would combine the documents of different technical fields when concerned with the problem solved by the device recited in new Claim 19. Considering the known use of hydrodynamic bearings in the field of motors, turbines and pipes, the use of the same in a laying head for forming coils cannot be considered as obvious. The skilled man is aware of the differences of the two technical fields, in particular, the dimensions and the weights of the rotating elements, the loads applied on the bearings, the eccentric forces and the degree of reliability requested. With these considerations in mind, the skilled man would not take into consideration the combination without exerting an inventive skill. Replacing the conventional mechanical bearings of a laying head for forming coils for hydrodynamic bearings, beyond answering to a requirement of increasing the speed of lamination solves essentially the following technical drawbacks:

1. The fact that particular loads in dynamic stresses should be supported.
2. The fact that the instability caused by the rotating masses, in particular considering the range of weights produced when different road steel are placed on the same laying head should be compensated.
3. The fact that in the phase of interbillet, the road steel is missing on the laying head causing another factor of instability during the lamination process (interbillet of 5-10 sec. every 40-50 sec. of lamination).
4. The fact that debris continuously deposited within the pipe due to the continuous wear and tear of the pipe with loss of material, causing an avoidable inaccuracy on the replacing of the pipe on the rotor to every change pipe should be avoided.
5. The fact that the violent collisions and contacts of the rolled steel in the inlet part of the coiling pipe should be absorbed.
6. The fact that the amount of the vibrations that are transmitted, through the bearings, from the rotary parts to the structure of machine and on the foundation should be reduced.
7. The fact that any deteriorations caused from the infiltrations of powder, incandescent slag, metallic particles produced in such devices in order to afford the high degree of reliability requested should be avoided.

All these technical effects are not obtained in the device according to the Grimmel et al. reference, where on both supports conventional mechanical bearings are used. By increasing the number of rpm, the vibrations produced by the presence of losses of balance of mass of the tube are increased as such bearings are not in a position to absorb hits to it deriving from the dynamic losses of balance.

In the Grimmel et al. reference, only the play is absorbed by applying a pressure on the rotor in an intermediate position between the supports but the technical problem of absorbing the vibrations is not entirely solved.

On the contrary, with the solution according to new Claim 19, it is possible to obtain a high number of rotations (and therefore an elevated productivity), whereas the damping characteristics of the hydrodynamic bearings remain unchanged with regard to the working conditions with the consequences that an increase of the vibrations due to the high spin speed is not present.

The reduced play provided by the hydraulic bearings of the invention, with regard to the one of the mechanical bearings, guarantees to maintain the position of the axis of the rotor also in conditions of consequent loss of balance due to the wear of the coiling pipe allowing the driving electric motor to work in the optimal conditions (maximum rendering). This maintains the power and the number of rotations.

With regard to the Grimmel et al. reference, the construction of the device recited in Claim 19 is less expensive and more reliable and reduces the costs of maintenance because it needs less mechanical components, and those components used are subject to minor wear, as the working life of they hydrodynamic bearings is practically without limits. It also gives a better working security for the workers operating near the apparatus who will have little worries and fears in proximity of the laying head. With the device according to Grimmel et al., the dangerous vibrations are produced on the structural parts of the machine with risk of yielding of the same.

The device recited in new Claim 19 solves this problem by dampening the vibrations. The hits and strokes caused by the dynamic losses of balance are absorbed and dampened by the hydrodynamic means, so that the forces exerted on the structure of anchorage and the foundations are reduced, and due to the self-regulation of the hydrodynamic bearings, the loss of

balance is compensated, as the action of oil in the bearings are constantly regulated and addressed exactly where the loads act.

The choice of hydrodynamic bearings on the head for forming coils is not only the solution of a complex technical problem, but as stated before, it is also the overcoming of a technical prejudice of the skilled persons in particular because hydrodynamic bearings are normally used in devices working, to regimen, always in balanced conditions as the turbines. Adapting hydrodynamic bearings on a laying head needed particular studies, in particular the specific planning of the bearings themselves.

Therefore, the cited references are not believed to teach, suggest, or make obvious all of the limitations of new independent Claim 19. Thus, Claim 19 is believed to be allowable, as are Claims 20-27, as being dependent upon an allowable base claim.

Conclusion

On the basis of the foregoing, the application is believed to be in condition for allowance. Entry of the amendments and issuance of a Notice of Allowance is therefore respectfully requested. Should the Examiner have any suggestions for expediting allowance of the application, the Examiner is invited to contact Applicants' representative at the telephone number listed below.

If any additional fee is required, please charge Deposit Account Number 19-4330.

Respectfully submitted,

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